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Proceedings Series 2000/33 | Série des compte rendus 2000/33

Proceedings of a Meeting on Scotian Shelf Groundfish Stocks Regional Advisory Process Maritimes Region

30 October – 3 November 2000
Best Western MicMac Hotel
Dartmouth, Nova Scotia

J.J. Hunt, Chairperson
St. Andrews Biological Station
St. Andrews, New Brunswick
E5B 2L9

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Canada

102-00709

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Foreword

The purpose of this proceedings is to archive the activities and discussions of the meeting, including research recommendations, uncertainties, and to provide a place to formally archive official minority opinions. As such, interpretations and opinions presented in this report may be factually incorrect or mis-leading, but are included to record as faithfully as possible what transpired at the meeting. No statements are to be taken as reflecting the consensus of the meeting unless they are clearly identified as such. Moreover, additional information and further review may result in a change of decision where tentative agreement had been reached. Therefore, only the Stock Status Report(s), which contain the consensus decisions of the meeting, should be used as sources of information on the status of the resource assessed. Additionally, any summary on the stock status presented in this proceedings should not be referenced. The Stock Status Reports are supported by Research Documents which will be finalized from the working papers presented at the meeting.

Avant-propos

Le présent compte rendu fait état des activités et des discussions qui ont eu lieu à la réunion, notamment en ce qui concerne les recommandations de recherche et les incertitudes; il sert aussi à consigner en bonne et due forme les opinions minoritaires officielles. Les interprétations et opinions qui y sont présentées peuvent être incorrectes sur le plan des faits ou trompeuses, mais elles sont intégrées au document pour que celui-ci reflète le plus fidèlement possible ce qui s'est dit à la réunion. Aucune déclaration ne doit être considérée comme une expression du consensus des participants, sauf s'il est clairement indiqué qu'elle l'est effectivement. En outre, des renseignements supplémentaires et un plus ample examen peuvent avoir pour effet de modifier une décision qui avait fait l'objet d'un accord préliminaire. Par conséquent, ce sont uniquement les Rapports sur l'état des stocks, reflétant les décisions consensuelles prises à la réunion, qui doivent être les sources de renseignements au sujet de l'état des ressources évaluées. Les brefs sommaires de rapport sur l'état des stocks présentés dans le présent compte rendu ne doivent pas non plus être considérés comme des textes de référence. Les Rapports sur l'état des stocks sont appuyés par les Documents de recherche, qui seront établis définitivement à partir des documents de travail présentés à la réunion.

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ABSTRACT

A Maritimes Region Regional Advisory Process (RAP) meeting was held October 30 to November 3, 2000 in Dartmouth, Nova Scotia, to consider stock status evaluations of 4X cod, 4VW yellowtail and plaice, 4VWX wolffish, 4VWX monkfish, and 4VW winter skate. In addition a review of information related to fisheries and research surveys, considerable discussion of the Traffic Light Approach (TLA) was completed for each stock assessment. Application of the TLA is stock/species-specific and will require further development. The draft Stock Status Report (SSR) for 4X cod was reviewed at the meeting and updates for other stocks were completed during follow-up discussions by Assessment Working Group at BIO. Further review of the remaining SSRs was completed via teleconference on November 14, 2000. SSR updates were submitted for selected stocks but were not reviewed by the meeting.

RÉSUMÉ

Une réunion du Processus consultatif régional (PCR) a eu lieu du 30 octobre au 3 novembre 2000 à Dartmouth (Nouvelle-Écosse), au cours de laquelle on s'est penché sur les évaluations d'état des stocks de la morue de 4X, de la limande à queue jaune et de la plie de 4VWX, du loup de 4VWX, de la baudroie de 4VWX et de la raie tachetée de 4VW. En plus de passer en revue l'information liée aux pêches et aux relevés scientifiques, on a aussi beaucoup discuté de l'approche dite des « feux de signalisation » pour chaque évaluation des stocks. L'application de cette approche se fait en fonction des stocks/des espèces, et il faudra l'affiner. Les participants à la réunion ont passé en revue l'ébauche du rapport d'état des stocks (RES) de la morue de 4X, et ont fait le point sur d'autres stocks durant des discussions de suivi des activités du groupe de travail sur les évaluations de l'IOB. Un examen des RES restants a eu lieu par téléconférence le 14 novembre 2000. Des mises à jour des RES ont été soumises pour des stocks choisis, mais n'ont pas été examinées à la rencontre.

INTRODUCTION

A Maritimes Region RAP meeting was held October 30 to November 3, 2000 in Dartmouth, Nova Scotia, to consider stock status evaluations of 4X cod, 4VW yellowtail and plaice, 4VWX wolffish, 4VWX monkfish and 4VW winter skate. The meeting was held at the Best Western MicMac Hotel in Dartmouth, NS. The meeting format consisted of presentations of working papers by the author(s), followed by discussion of issues and conclusions on the resource status. Rapporteurs were appointed for each session.

The draft Stock Status Report for 4X cod was reviewed at the meeting while those for other stocks were completed during follow-up discussions by an Assessment Working Group at BIO. A teleconference meeting was held November 14, 2000 to finalise the SSRs for winter skate, wolffish, flounder, and monkfish. An invitation to participate in the teleconference and distribution of the draft SSRs was made to all participants.

Participants included representatives of DFO Science Branch, DFO Resource Management, Provincial governments, and the fishing industry. A list of participants is provided in Appendix 1 and the letters of invitation in Appendices 2a and 2b.

The adopted agenda and schedule for the meeting is given in Appendix 3, and a copy of the meeting remit in Appendix 4.

Documents tabled during the meeting included stock-specific details and evaluations, an environmental overview and results of recent groundfish research surveys in 4T and 4VWX. The research survey documents were not reviewed, but were available for information. Titles and authors are listed in Appendix 5.

Research recommendations are included in the species sections and summarised in Appendix 6.

PRECAUTIONARY APPROACH – TRAFFIC LIGHT MODEL

Working Papers: Presentation by Bob Mohn

Referees: none

Rapporteur: Joseph Hunt

Bob Mohn presented results of recent developments in the application and graphic representation of traffic light information. It was emphasized that this was a report on 'work in progress' rather than the final look and that further developments could be anticipated. Note was made that two workshops had been convened to consider the application of traffic lights in evaluating stock status. Copies of one draft report (Use of the traffic light method for application of the

precautionary approach to fisheries management planning : a methods workbook) was made available by Ralph Halliday during the meeting.

Discussion on the variety of potential status indicators, establishing boundaries between green/yellow and yellow/red status levels and the extent of interaction or redundancy within a suite of indicators, confirmed the need for further work outside of the RAP forum. Although the question of defining criteria to optimally set boundaries will take more research, a set of simple default boundaries were adopted by the RAP.

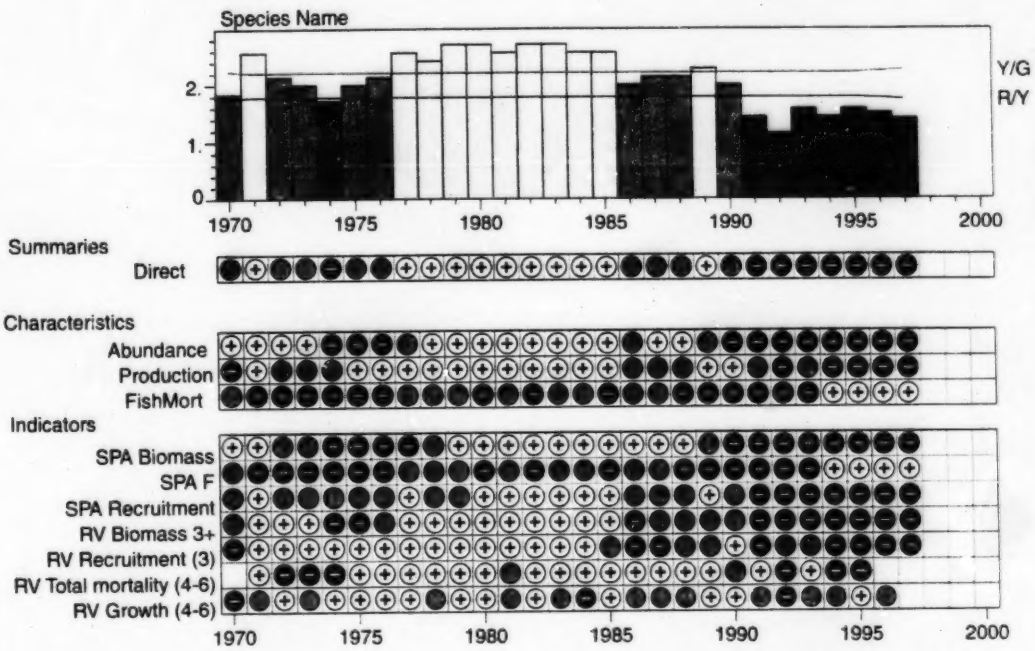
A graphic model based on an ACON application was presented. Participants agreed that this type of model was easy to visualize, but concern was expressed that the method for determining the colour of indicators was more difficult to understand.

Further evolution and enhancement of the ACON model was completed during stock specific discussions. A generalised statement and introduction of the Traffic Light Method was drafted for inclusion in each SSR with a Traffic Light table.

This table shows the annual values of each indicator as one of three lights depending on whether they are among the highest values observed for that indicator, among the lowest, or in between. For indicators such as stock biomass and recruitment, high values are good and have a green light + and low values are bad and have a red light ●. However, for indicators such as mortality, high values are bad and are assigned a red light, whereas low values are good and receive a green light. Intermediate values are yellow ●.

The results for the indicators combined are shown in the summary line above the array of individual indicators. If most indicators in a particular year are red then the summary light for that year will be red, if most are green the summary light will be green, and so on. The actual summary scores from the range of indicators in the table are shown in the bar chart above the table. The height of the bar determines the colour for the corresponding year and the horizontal lines on the bar chart indicate the boundaries between the colours (red-yellow and yellow-green).

An illustration of a generalised traffic light chart is shown in the following figure:



SUMMARY OF SCOTIAN SHELF TEMPERATURE CONDITIONS IN 2000

Working Paper: Drinkwater, K.F., R.G. Pettipas, and L.M. Petrie. 2000. Temperature conditions on the Scotian Shelf and Eastern Gulf of Maine in 2000 (RAP Working Paper 2000/46)

Referees: n/a

Rapporteur: Ken Drinkwater

Air and ocean temperatures during the first 9 months of the year 2000 were described. Monthly mean air temperatures at Shearwater near Halifax and on Sable Island were above normal (relative to the 1961-1990 means), except July at Shearwater. The largest anomalies occurred during the winter (January to April) with amplitudes of 2°-3°C above normal. In spite of such warm air temperatures, they are below the record high values observed at these sites in 1999. The warm air temperatures in 2000 are believed to have contributed to the warmer-than-normal sea surface temperatures over most of the Scotian Shelf during the July DFO groundfish survey through larger atmospheric heat fluxes. Similar to air temperatures, surface waters in July 2000 are cooler than those observed in the same month in 1999 over most of the Shelf.

Near-bottom temperatures over the Scotian Shelf were above normal in July of 2000 (again relative to 1961-90). In the northeastern region of the Shelf this continued a general trend of increasing bottom temperatures that has occurred since the minimum observed in the early 1990. It is the second year in succession that waters have been near or above normal in this region following approximately 15 years of below normal temperatures. In the central (Emerald Basin) and southwestern portions of the Scotian Shelf, temperatures were also above normal. This is similar to conditions through most of the 1980s and 1990s with the exception of 1998. At that time very cold conditions were observed due to an intrusion at depth of offshore Cold Labrador Slope Water (4°-8°C) onto the Shelf through gullies and channels. This Labrador Slope Water had moved southward to the Middle Atlantic Bight along the shelf edge replacing Warm Slope Water (8°-12°C) during 1997 and 1998. This, in turn, was due to an increase in the transport of the deep (100-300 m) Labrador Current. In 1999, as the Labrador Water retracted northward the Warm Slope Water moved back in along the Shelf edge and eventually intruded onto the shelf.

In the eastern Gulf of Maine in Georges Basin, near-bottom temperature trends were similar to Emerald Basin with warm conditions in 2000 and 1999 following very cold conditions in 1998. Warm conditions were also observed in the near bottom waters on Georges Bank and on Lurcher Shoals off southwest Nova Scotia in 2000. Cold temperatures were also observed at these sites in 1998.

In summary, air and ocean conditions over the Scotian Shelf and the eastern Gulf of Maine were warmer-than-normal in 2000.

4VWX5Zc MONKFISH

Working Paper: Beanlands, D., B. Branton, and B. Mohn. 2000. Status of Monkfish in 4VWX5Zc. (RAP Working Paper 2000/47)

Referees: None

Rapporteur: Stratis Gavaris

The Fishery

Landings prior to 1986, when there were limited markets, are not considered to be a reliable reflection of the catch. Landings after 1993, when DMP was introduced in the offshore scallop fishery, are considered more accurate but there may still be discarding in the scallop fishery.

Monkfish are caught as by-catch in the groundfish and scallop fisheries. However, true incidental catch in both scallop and groundfish operations may be low as boats tend to "top up" trips with tows directed for monkfish. This practice is reportedly less prevalent in the scallop fishery when the more valuable scallop are abundant and catch rates are high. There was a limited directed fishery in 4X between 1995 –1999.

By-catch in the <65' OT fishery was limited to 20% in 4X and 10% in 5Zc since 1995.

There was concern about the ability to identify by-catch subtrips in order to quantify effort and CPUE and uncertainty about how this information could be interpreted.

It was proposed that the limited directed fishery operates in a very restricted area, the "monkfish hole", and those catch rates should not be viewed as indicative of global abundance. The gear used in the directed fishery has remained the same over the 5 years. Three distinct patches are exploited in the directed fishery but the CPUE is dominated by the area of the "monkfish hole".

Comparison of length composition from the directed fishery (203mm) and the by-catch fishery (130mm) showed little difference. It was speculated that not much selection occurred for the large headed monkfish but the 203mm mesh was effective at limiting by-catch of other groundfish.

Resource Status

Since 1970, RV Survey abundance and biomass on the Scotian Shelf declined sharply between 1977 and 1979 and subsequently declined gradually to the lowest levels during 1989 to 1994. Since then, abundance has increased to the highest level while biomass has only increased slightly. Trends on Georges Bank from the DFO survey and the NMFS survey are similar.

RV Survey abundance of <46cm was fairly stable between 1970 and 1989 and has increased substantially since then to the highest observed while abundance of >46cm declined sharply between 1977 and 1979 and has fluctuated at low levels since then with a modest increase since 1994. The effect on size selectivity due to changes of survey vessel and gear that occurred in 1983 are unknown.

The view was expressed that a stratified random survey may not produce a very reliable index of abundance for a species like monkfish which has a very patchy distribution and displays strong habitat preference. Most of the commercial catch occurs in a small area of 4X, in the vicinity of strata 82 and 83 which receive two sets each in the survey design.

Though the increased abundance of <46cm fish suggests good recruitment in recent years, comparison of length frequencies, aggregated by decade since 1970, indicate fewer large monkfish in the 1990-2000 period.

The spatial distribution of small monkfish in the RV Survey corresponds roughly to the pattern observed in the Industry Survey, though there appear to be some small scale differences.

The Industry Survey covers 4X and 5Zc and does not display any persistent trend during the short duration, 1995-99. The RV Survey also does not show any persistent trend over this period.

Though the regression for condition factor over years was not significant, this is not necessarily indicative of no trend. Predicted weight in recent years appears to be at the lower range. There

was concern regarding the adequacy of the fit for annual length weight regressions when so few monkfish are caught in any given year but this aspect was not examined. It was noted that, by analogy with cod, low condition may be associated with reduced reproductive capacity, but observed survey trends suggest improved recruitment in recent years.

Mortality calculations may be confounded by recruitment events. Results were examined for different length ranges and various time windows.

The fit of the data to the production model did not appear particularly good. Inclusion of pre-1986 catch data, which is not considered reliable, would impact results and is not recommended.

Indicators for 4X only would be included in the Traffic Light Summary.

Problems associated with averaging Traffic Light indicators over series with gaps have not been resolved, though shorter time series can be given lower weight.

Management Considerations

Stock structure is not well understood and it was recommended that this be investigated, however specific practical suggestions were not forthcoming.

Very little is known about the quantity and size composition of the catch from the scallop fishery which has landed substantial amounts in past as there is no sampling information from this fleet. It is recommended that adequate monitoring be instituted.

Research Recommendations

1. Stock structure should be investigated, however specific practical suggestions were not forthcoming.

2. Adequate monitoring should be instituted for the catch of monkfish by the scallop fishery.

4X COD

Working Paper: Clark, D., S. Gavaris, and S. Paul. 2000. Assessment of cod in Division 4X. (RAP Working Paper 2000/48)

Referees: n/a

Rapporteur: Paul Fanning

General

Stock structure is still subject of research but status quo appears to still be best breakdown. The Scotian Shelf (SS) component, including Browns Bank and adjoining shelf waters, the area of 4X east of Browns and the Fundian Channel, is characterised by slower growth. The faster growing Bay of Fundy (BoF) component includes the bay itself, shelf and basin areas to the south of the bay and the "inshore" area off southwest Nova Scotia. A small component appears regularly in the area inshore of Lahave Basin but is not treated separately in the assessment.

Fishery

Catch

Since the widespread coverage of the fishery by DMP (1993) there appears to be a reasonably good handle on landings. Some at-sea observer coverage has been available but it is not complete. During discussions, it was suggested that under-reporting and non-reporting has been increasing in the last 2 years, at least for certain fleets. This has not been widely reported in consultations.

Catch rates

The issue of whether catch rates represent abundance, given management restrictions, was noted but the assessment does not use the catch rate as an indicator. The BoF gillnets report the best catch rates seen in recent years but this was not true for all sectors or areas. The high GN catch rates may be related more to the size range of available fish or simply the area rather than overall abundance.

Catch at age

Shore sampling includes both DFO and industry and the sampling coverage is as good or better than ever. Both seasonal and area coverage was well matched to the fishery including good sampling of handline in 2000. At-sea observer coverage provided additional length frequency data. One change in the construction of the catch at age is in the fixed gear. Previously this gear was primarily used on Browns Bank and the size and age composition was similar to the rest of the shelf. More of the fixed gear are now fishing in channels and deeper water and these catches have been treated separately from the rest of the shelf in 2000.

The predicted catch at age from the last assessment noticeably overestimated age 7+ (fully recruited) contribution to the catch. The size composition of the longline catch includes a large fraction of 3 year olds (46 cm) relative to all other gears which would have shifted the age composition as noted. Relative abundance of older fish in survey may be actually higher than in catch, however there will be a tendency for the industry to avoid catches of large cod due to the by-catch restriction on cod landings. The large cod are caught when directing for cod and in that instance the catches are quite clean with little or no commercial by-catch. However, since cod quota is restrictive on other fisheries most of the cod is saved for by-catch in the haddock fishery and those tend to be smaller cod.

Surveys

ITQ

A review of the ITQ survey recommended that the first year be dropped because of the change in area covered. Given the fixed station design, a simple mean for each of the remaining years.

A single large catch of cod (Stn 310) in 2000 causes massive changes in the ITQ index and is not considered representative of overall stock status. Because the ITQ survey is fixed station, the station was removed from all years to remove a bias due to variable numbers of sets by years. The problem with this set is particularly severe in this assessment since it is the terminal year of the model and exerts very large influence on the fit. This aspect of the problem will decline in future years as additional information about year-class strength further constrains the model.

It was noted that model based options to replace the one big set in 2000 will allow use of all the data in every year of the series while accounting for the fixed station design. The RAP recommended that a model-based treatment be developed to ensure 'missing' sets can be accommodated.

A concern was raised that the very large estimates of year-classes in 98 and 99 are good signs of recruitment but are not included in model, leading to the question, what is this doing to our perception of fishery? Given that they are both still too young to be recruited to the fishery there is no impact from them not being fitted in the model.

The ITQ survey has become well-established and the sampling and data collection process is working well. There would be some value in developing more information specifically from the inshore area, particularly through age sampling. The ITQ survey distribution indicates that about $^2/_3$ of the cod are found in BoF while July RV finds about ½ in the same area and about 40% of the fishery comes from the Bay of Fundy.

Research Vessels

The observation of few fish east of Roseway Bank has been seen regularly but this is the first year when no fish were caught in this part of 4X. Of more concern is the low numbers caught around Brown's Bank as this is a normal area of concentration

The very low catches by the RV for very young ages raised concerns that the RV underestimates young year-classes. Although the catches are low they should provide a consistent but variable relative index of year-class size. The ITQ survey uses a foot gear which gives much better bottom contact and appears to have higher selection for younger fish. Therefore, in the ITQ survey the age composition peaks at age 2 while the RV selection does not level off until age 4.

Mortality Rates

The total mortality (Z's) from RV and ITQ surveys both suggest high mortality now. Somewhat contradictorily, the relative F declined sharply 7 years ago and has remained low since. Given that the Z's have not apparently changed over the same period this can suggest increased M. This is difficult to interpret as the Z's have not tracked the assumed dynamics of stock mortality, i.e. the high mortalities in the early 1990's are not apparent.

Traffic Lights

A preliminary summary of the traffic light model was presented. Results of the model did not appear to adequately represent stock status with some apparent inconsistent trends. Discussion of the relative significance of indicators and the appropriate boundaries did not result in consensus. Concerns was raised about the inclusion of SPA derived indicators in the traffic light model and the possibility of double counting. For example, the population from SPA is derived in part from RV indices and it might be invalid to consider both SPA and indices in the same model assuming they are independent. Therefore the traffic light results were not included in the SSR pending further work on the structure and application of the model.

Population Model

The model formulation was revised from the previous assessment to include more information about the older ages. Last year the VPA matrix was limited to age 11 while the catches to age 14 are used now. There was difficulty last year determining whether the fishing mortality pattern (PR) was showing a dome or not. In the last assessment, both options were considered and population biomass for each was presented. In the current assessment the ages are included for ages 2 to 14 although the calibration is limited to ages 2 to 8. Instead of fitting RV catchability at all ages, it is assumed constant for ages 4-8. The oldest ages, except for the last two years are assumed equal to the average of slightly younger ages. This assumption allows for a dome-shaped PR if the catch data suggest it.

One difference between last years PR assumption and this years was an inconsistent treatment of the oldest age (assumed domed but fitted to fully recruited ages). This has been revised this year. The relationship between RV biomass and SPA biomass appears to have changed over time and indicates that the domed estimate for older ages may not be sufficiently severe

The model retrospective seemed to be minimal with most year-class estimates being quite stable as additional data is included. The retrospective plot for biomass does seem to show more

variability than is suggested by the year-class estimates, however because of year effects in the model fit, the individual year-classes may sum to a more variable biomass estimate in a given year. The ITQ survey was not included in the model for the retrospective plots since the time series is too short.

An inconsistent pattern in the mean weights for oldest ages has some cases where the average weight in the catch is less than the beginning of year weights. The impact on the biomass estimates is minimal since the numbers at those ages are very small however the inconsistency should be corrected. A growth model could be used to predict weights instead of using the data however a simple adjustment of the expected mean weight in the catch to the beginning of year weight if it is less.

The dome-shaped PR results in a large abundance in the older ages (9+), in some cases the highest numbers in the VPA at age. Although changes in the fishery to avoid larger fish may be an explanation for the absence of these ages in the fishery, it is difficult to reconcile with the very low survey abundance at those ages. The question was raised as to whether the inclusion of data from the inshore area with the BoF may be contributing to the apparent dome in PR. As an alternative, changes in M may also explain the apparent lack of older fish. The RV data alone will not allow us to estimate this for the oldest ages due to lack of fish. A variable M model in the VPA to be presented.

Concerns were raised about whether the appropriate SSB trend should be the ages 4+ rather than ages 4-8 as presented. There is little reason for confidence in the estimates of SSB at older ages since there is little catch reported and no indices are available for calibration. It was suggested that comparisons of the 4-8 trend with respect to the 4+ trend would lead to little difference in interpretation. The effect of the dome-shaped PR does result in a considerably faster apparent recovery in the SSB than the 4-8 series.

Some suggestions were made for model examination. We should see impact of fixing the survey catchability for ages 4-8 to single value, in particular this could help understand what an appropriate view of partial recruitment for older ages might be.

The indices in the diagnostic figure (fig 37) should be q-scaled so the lines can be compared directly. The biomass estimates are currently based on population weights at age which come from the survey at ages 1-3 while the rest come from the catch. The RV weights at age are generally considered the best population estimates and the difference should be reviewed. A specific issue was the effect of the distribution of catch by the fishery leading to weights greater than in the RV.

Projections

The PR from the last 4 years were selected (arbitrarily) as representative of the current conditions and the smoothed means were used for projections. The effect of the dome shaped PR is to indicate abundance of older fish but they are not available to the fishery. As a result the effects cancel in terms of catch projections. The more important effect of the dome shaped PR is on the

estimated SSB. A specific target of 40Kt SSB has been set however this cannot be matched since the basis of the assessment has changed given the domed PR. Re-scaling the target in terms of the new formulation has been proposed but, as the target was presented as a fixed value, it is not clear whether that will be acceptable. The target set last year is equivalent to a 60% increase in SSB over three years.

The projection indicates a 20% biomass increase for 2001-2002.

The effect of the dome on $F_{0.1}$ or harvest strategy needs to be reconsidered. Yield per recruit considerations are not the only point.

Research Recommendations

1. Investigate use of a model-based treatment to ensure 'missing' sets can be accommodated.

DIV. 4VsW WINTER SKATE

Working Paper: Simon, J.E., and K. T. Frank. 2000. Assessment of the winter skate fishery in Division 4VsW. (RAP Working Paper 2000/49)

Referees: n/a

Rapporteur: Kenneth Frank

The Fishery

In the past, FRCC recommended the industry attempt to diversify their catch of skate and identify it to species. This was based on the observation that industry was capable of selectively catching the largest species - winter skate. Recently, some landings of thorny skate have been made and there has been a notable improvement in species identification.

The question of by-catch in the directed fishery was raised. Industry stated that the use of a 12 inch mesh has been in place since the start of the fishery and by-catch has been minimal. Currently, only 10% of the catch is composed of other skates – primarily thorny skate. There was also some concern that modification to the gear design might have influenced the time trend in the commercial CPUE. However, there have not been any significant modifications to gear design since 1995.

It was noted that short-falls in quota have occurred in the past few years. It was stated that market conditions have influenced effort but effort trends have not been summarized or tabulated for this fishery. Such a summary would help to interpret the quota short-falls.

Argentina product came on very strong during the 1998 skate fishery and this reduced the market demand in France. Markets are best October through March. This helps to explain why skate

were left in the water that year. Landing short-falls were also noted in U.S. skate fishery in 1998. In year 2000 the size of product from the 4VsW skate fishery was larger than in 1999.

Resource Status

Recently, industry have not been fishing during May-September when fish are on the banks, instead the fishery is now dominant in the fall when skate are in deeper water. The summer RV has revealed an increase in biomass in the slope strata, however there has been a decrease in the quantity of large (>85 cm) skate. In general, the modes in the annual size frequency distribution from the summer RV do not track very well.
It was noted that the peak in the size of skate captured in the fishery is close to the size of first maturity, therefore many immature fish are captured in the commercial fishery.

It was suggested that the apparent re-distribution of winter skate from the bank to the slope strata was related to temperature. Because winter skate are at the northern limit of their distribution, they are likely to be influenced by temperature changes. No one has looked in detail at the relationship between temperature and distribution of winter skate in summer RV.

Industry/Surveys

During the industry/science surveys, each boat was given a choice as to where to fish - the so-called "Captain's choice" sets. The question was posed - how were the set locations decided? Industry responded that they did not just try to fish in the hot spots but moved around and experimented. Also, directives from Science called for not making more than one set in a given strata when the first set was in a hot spot.

Inter-comparisons of the industry and summer RV were made. There was a general lack of agreement between summer RV and spring and fall industry surveys. However, in the past there appeared to be better agreement but now the correspondence is not as good for any particular sub-area (e.g. slope and non-slope strata) or for 4VsW as a whole. Biomass estimates derived from the two surveys are also different, with the industry survey yielding estimates between 7-10-fold higher.

There was extensive discussion on the traffic light summary. At the outset it was stated that the documents must have figures or tables for any of the traffic light indicators. For example, there was no graph of relative F and to be acceptable the data must be available for evaluation.

It was agreed that using the summer RV indices from slope and non-slope strata was not acceptable. Rather, the index should represent the entire 4VsW area. It was recommended not to dis-aggregate the survey data in the traffic light summary. Inclusion of a biomass index from the spring RV survey from the entire survey area was also recommended in the traffic lights.

The question was raised whether or not the dynamics associated with the summer RV mean weight time series was understood. It was suggested that mean weight in the RV catch should be included because it provides some information on the size structure of the population and is

fundamentally different from the condition factor index. It is also not related to recruitment pulses given that the reproductive output of skates is more or less constant from year to year. The issue of the influence of discarding on the mean weight time series was also raised. A contrary opinion suggested that it was impossible to determine what was the normal period, e.g. was the pre-1975 mean weight per tow the normal period or was it in fact abnormal? This point needs resolution, particularly if it is set as an objective that we want to return to through some management measures. Some suggested that big is better and we should indeed be striving for a size structure skewed towards larger individuals. The opinion was also expressed that we should not be looking at compound indicators, particularly when there are other more direct indicators available. Finally it was decided to delete the mean weight indicator and replace it with biomass trends for both juvenile and spawning fish. It was requested that biomass trends for 75 cm + fish (mature biomass) and an index of recruitment (less than or equal to 60 cm) using a common length-weight relationship be developed.

Differential estimates of mean weight were also noted between 4X and 4VsW. Could it suggest that as winter skate grow they move from 4X to 4VW? This has not been investigated.

Default levels for the indicators in the traffic light approach need to be used which have been previously been decided upon. Traffic light indicators for industry survey should correspond to the RV survey (mature and immature) if possible.

Interpretation of Z's is problematic. Does it have any real meaning for the exploitation of the fishery? Total mortality based on catch curves calculated in the manner presented in the research document does not give contemporary information. Instead it represents an integrated picture of exploitation over the last several years. Indeed it was puzzling to see such dramatic changes (doubling of Z's from 1995 to 1997) when there are so many common ages groups in the fishery over that time period. Also, we would have expected to see a great change in the length composition in the industry survey and this was not apparent. Alternative approximations of Z's were discussed. Age-length keys applied to catch rates could be used to convert the data into an age-based matrix of abundance indices and then calculate Z's across adjacent years. There is quite a bit of uncertainty about the total mortality estimated from the commercial landings (also contradictory signals). Conversely, some have argued in favor of the Z calculation suggesting that is reflects the effects of fishing on this stock (larger fish are not available to the fishery) – obviously there is no consensus on this point. It was agreed to include Z in the traffic light approach but the author will have to provide all the caveats/concerns raised during the discussion.

Observer data from the fishery has not been examined to the same extent as the observer data from the industry surveys. It was recommended that a detailed examination of the observer data associated with the commercial fishery be undertaken.

<u>General considerations that preceded the general, structured discussion by section:</u>

Industry representatives made the point that maintaining the experimental fishery for skate is the best option because it is now better regulated than in the past.

Age structure of the population – is it known? Only a single preliminary growth model is available and this was used to convert commercial length to ages for the estimation of total mortality.

Does the re-distribution of skate from the summer RV, from shoal waters to deeper strata, suggest depletion? No, biomass actually does increased in the slope strata.

The Summary bullet suggesting that the industry surveys present a more optimistic picture needs clarification. In fact the industry survey appears to use gear that is more efficient at catching larger skate than the RV survey gear. Shift in biomass from banks to slopes – is it influenced by temperature? There have been no systematic studies on the relationship between survey temperatures and survey abundance.

Research Recommendation

1. A detailed examination of the observer data associated with the commercial fishery should be undertaken.

4VWX WOLFFISH

Working Paper: McRuer, J. 2000. Atlantic wolffish in the Maritimes and Gulf of St. Lawrence. (RAP Working Paper 2000/50)

Referee: n/a

Rapporteur: Mark Showell

Background

The remit of the present RAP is to provide an assessment of 4VWX wolffish only, but this resource is widely distributed over Atlantic Canada. This species is currently undergoing evaluation as a potential endangered species by COSEWIC, and in preparation for this appraisal information from other regions is included here.

The Fishery

There is no directed fishery for wolffish in Atlantic Canada - all landings are by-catch only, limited to 10% on a trip basis on the Scotian Shelf generally, with a 20% limit for the mobile gear fleet from April to October. However, a high proportion of subtrips show wolffish to be the major species caught, as effort is directed in areas where wolffish are known to be abundant. Catches are therefore not truly incidental catches.

Landings

Reported landings from NAFO Subarea 4 and 5YZe were in excess of 2000t from the early 1960's to the mid-1980's, peaking in 1983 at more than 4000t. Landings dropped quickly subsequently, and are presently about 600t. The majority of the landings are by otter trawl gear in 4X.

US landings in NAFO Subarea 5 are at time substantial, and have been estimated in recent years from the historical proportion of the USA catch of the 4X/5Z total over the past decade. The accuracy of these estimates was discussed, and they appear to be reasonable.

Landings of wolffish are predominately occur in May and June. This corresponds to the spawning period for this species, and concern was expressed that landings during this period may have a negative impact.

Industry comments indicated that the distribution of effort in 4X was related to conflicts with lobster gear and seasonal closure of Browns Bank, rather than abundance of the resource.

Research Vessel Surveys

Distribution

Information on distribution was available from several DFO and Industry surveys. Based on the summer RV survey, wolffish were most abundant in 4X and 4V. The 4VsW fixed gear Industry survey covers areas closer to shore than the summer RV, and shows high numbers of wolffish to be present in this area. The ITQ Industry survey in 4X does not show a similar inshore distribution, likely because this survey uses mobile gear which is less selective for wolffish. The distribution of summer RV survey stations in 4X was discussed. Industry indicated large catches of wolffish have been common at times from an areas known as the 'catfish holes', which are in an untrawlable area not sampled by the summer RV survey.

Abundance and Biomass

Results of the summer RV survey show wolffish abundance to be increasing in 4VWX for recent years, although biomass is currently at a low level.

Area Occupied

Indices of resource concentration and distribution of range show a downward trend in recent years for 4VWX, indicating wolffish are becoming more concentrated and their range reduced. This trend is opposite to that seen for abundance, and the interpretation of the index was discussed. It was noted by industry that the distribution of this species may be driven by the distribution of prey (scallops) which are now concentrated in 4X. Concern was expressed that changes in size distribution may be confounding trends in resource concentration, and a reanalysis of this information separating mature and immature fish was requested.

While concentration and range reduction are normally seen as negative, it was noted that these must be considered in conjunction with other factors. It is possible that for this resource a concentrated state may not be negative.

Length frequency

Distribution of lengths in seen in the summer RV survey shows an increased abundance of immature fish (< 55 cm) since 1985, while the abundance of mature fish has declined over the same period. The observation was made that the length frequencies from RV were based on relatively small numbers, and this made tracking year classes difficult.

It was noted that the wolffish < 10 cm in the 2000 survey were particularly abundant, at the highest level seen in the series. This suggests good recruitment prospects.

A decline in mean individual weight from the summer RV was noted, with a sharp drop in 1985 followed by subsequent more moderate decline. This trend was interpreted as an indication of strong recruitment starting in the mid-1980's. The possibility that this pattern might be the result of the 1983 change in survey vessel was considered but rejected.

Growth and mortality

Total mortality indices were estimated by applying Von Bertlanffy growth parameters from literature to RV length frequency distribution. Results of this analysis indicate Z was lowest in 1979-81, peaked in 1992, but declined subsequently. It was noted that this pattern does not correspond to that of the landings, although it is consistent with RV recruitment trends. However, it was noted that excluding immature fish from the analysis did not change the pattern. Concern was expressed that biases resulting from limitations in the 4X summer RV coverage may be biasing the results. Additional analysis was promised by R. Mohn to clarify.

Condition

Predicted weight at length was calculated for juvenile and adult wolffish. A slight declining trend was apparent for adults only, although a high degree of variability was noted in the data on which the calculation was based.

4VW PLAICE AND YELLOWTAIL FLOUNDER

Working Paper: Fowler, G.M., and W.T. Stobo. 2000. Status of 4VW American Plaice and Yellowtail flounder. (RAP Working Paper 2000/51)

Referees: n/a

Rapporteur: Lou VanEeckhaute

Fishery

The fishery in 2000 is focusing on plaice as opposed to yellowtail due to low abundance levels of the latter and a market glut from yellowtail from areas where they are plentiful and larger than the fish from this area. Fishermen have come into conflict with the crab fishery and some have switched to that fishery in 2000. Fifty percent of flatfish landings are made by 28 boats.

Resource Status

Ageing for plaice is done but it is suggesting a change in growth. The ageing of recent samples needs to be compared with older samples to determine whether this observation is being caused by an ageing problem. It was noted that tagging data from Newfoundland has indicated problems with the ageing of yellowtail. A yellowtail ageing workshop in November of this year is scheduled to address these problems.

There is an analysis currently underway of some older tagging data that shows that plaice have limited movement out of the gulf. Yellowtail returns have been limited because of the lack of a fishery for them.

Yellowtail Indicators

RV abundance of big fish: correlates very highly with biomass.

Length at 50% mature (L50): problem with reliability of maturity determination at time of survey so should not be used as an indicator.

Relative F: very low because lack of a fishery.

Area occupied: It was questioned why this indicator was being switched to large fish rather than all fish, as was used for other stocks. The indicator for large fish only shows a trend whereas the one for all fish does not. As presence/absence drives the indicator, if small fish are everywhere then the indicator is reflecting that.

Condition (Predwt35cm): Predicted (from length weight relationship) and observed diverge for flatfish but trends are still similar so no adjustment is needed.

Plaice Indicators

Condition Factor: Industry has not observed any changes in condition factor as could be observed from yield.

Traffic Light Indicators

Condition factor is considered an easily measured and uncomplicated indicator to use in the traffic light method but little is know where to set boundaries for flatfish and it was questioned whether it gave any useful information. In other species, for which more information is known, such as cod, a low condition factor for an individual may lead to an inability to spawn, or, if spawning does occur, mortality after spawning. A suggestion to correlate condition with other more understood parameters was rejected as the traffic light approach is designed to receive input from each indicator on its own merit.

Traffic light boundaries for indicators for which little is known about appropriate good/bad boundary levels can be examined using two default methods, one of which sets the y/g boundary at the average value and the r/y boundary at 20% below the y/g boundary (the "average" method) and the "percentile" method which slices the range into thirds. When appropriate, deviations from these approaches can be made. Both of these methods magnify the boundaries between y/g and r/y. When the significance of the boundary levels is not known, lower weighting of that indicator can be explored.

ACKNOWLEDGEMENTS

Administrative support was provided by Valerie Myra (RAP Co-ordinator's Office) and by Wanda Farrell (MFD). Preliminary review and evaluation of stock status prior to the meeting were conducted by assessment working groups at BIO (Steven Campana, Chairperson) and St. Andrews (Rob Stephenson, Chairperson)

Appendix 1: Participants

RAP Participants

Annand, Chris
Arsenault, Susan
Baker, Nellie
Beanlands, Diane
Black, Jerry
Branton, Bob
Caihong, Fu
Campana, Steve
Clark, Donald
Comeau, Peter
D'Entremont, Claude
D'Entremont, Jean-Guy
Donaldson, Gilbert
Drinkwater, Ken
Fanning, Paul
Farwell, Sandra
Fowler, Mark
Frank, Ken
Gavaris, Stratis
Giroux, Brian
Grady, Don
Grover, Willard
Halliday, Ralph
Hansen, Jon
Harris, Lei
Hunt, Joseph
Hurlbut, Tom
Hurley, Peter
Johnston, Marc
Lane, Dan
Liew, Doreen
McRuer, Jeff
Mohn, Bob
O'Connor, Michael
Paul, Stacey
Penny, Christine
Reardon, Clary
Rowe, Sherrylynn
Sciocchette, Robert
Showell, Mark
Simon, Jim
Sosebee, Kathenne
Stobo, Wayne
Swain, Doug
Van Eeckhaute, Lou
Voutier, Jan
Walters, Evan
Wilcox, John
Wolkins, Ronald
Yeadon, Maureen
Zwanenburg, Kees

Teleconference Participants

Beanlands, Diane
Campana, Steve
Clark, Donald
D'Entremont, Claude
D'Entremont, Jean-Guy
Fanning, Paul
Fowler, Mark
Gavaris, Stratis
Halliday, Ralph
Hunt, Joseph
Hurley, Peter
McRuer, Jeff
Mohn, Bob
Showell, Mark
Simon, Jim
Van Eeckhaute, Lou

Appendix 2a: Letter of invitation

Marine Fish Division
Maritimes Region
Science Branch
(TEL: 902 426-4890)
(FAX: 902 426-1506)
(E-mail: farrellw@dfo-mpo.gc.ca)

October 4, 2000

Distribution

Subject: Maritimes Region RAP Meeting on Finfish Stocks, October 2000

A meeting of the Maritimes Regional Advisory Process will be held 30 October - 03 November 2000 to review the status of the following finfish stocks:

- Cod, 4X
- Plaice, 4VW
- Yellowtail, 4VW
- Skate, 4VsW
- Monkfish, 4VWX
- Wolffish, 4VWX

If sufficient data is available, full assessment for the following stocks will also be reviewed:

- Cusk, 4VWX
- Atlantic halibut, 3NO3Ps4VWX5

Stock Status Reports and associated research documents will be produced for these assessments.

Updates will be available, but not reviewed, for the following stocks where the stock status is unlikely to change, or where work in progress is likely to lead to a significantly improved assessment in 2001:

- Cod, 4Vn
- Cod, 4VsW
- Pollock, 4VWX5Zc
- Haddock, 4VW
- Haddock, 4X
- Silver hake, 4VWX
- Redfish, Unit 3
- Plaice, Yellowtail, and Winter Flounder, 4X

- White Hake, 4VW and 4X/5
- Witch Flounder, 4VW and 4X

These updates will present the most recent trends in the fishery and resource status and provide updated outlooks, based on the 1999 RAP.

Oceanographic Overview

An overview of ocean climate conditions on the Scotian Shelf during 2000, in comparison to the historical record, will be will be presented. No Stock Status Report will be produced

The meeting will deal with technical issues only; catch allocations and other managerial issues will not be discussed.

As chairman, I invite you to participate in this meeting. This invitation is extended on the basis of your knowledge and experience; you are not selected to represent some specific group. As a participant you will have full status at the meeting. This could include opportunities to make presentations at appropriate periods of the agenda, to contribute to the peer review of any work tabled at the meeting, to receive all documentation, and to participate in the discussions which become the basis for stock status reports on each stock. Please note also that you will be expected to respect the confidentiality of the meeting results until the reports are made public a few weeks after the meeting.

The meeting will be held in the Best Western MicMac Hotel, 313 Prince Albert Road, Dartmouth, starting in the afternoon of Monday 30th October and extending through the afternoon of Friday 3rd November. A proposed schedule is attached.

If you plan to accept this invitation, please inform Wanda Farrell (ph: 902-426-4890: fax: 902 426-1506 or e-mail: farrellw@mar.dfo-mpo.gc.ca) at your earliest convenience.

Yours sincerely,

Joseph Hunt
Chairman

cc: W. Stobo
P. Fanning
R. Stephenson
B. O'Boyle

Appendix 2b: Letter of invitation – teleconference

Discussions with the RAP Steering Committee have identified a requirement for further review and approval of SSRs for wolffish, skate, flounder and monkfish. The SSR for 4X cod was completed during October30th - November 3rd meeting and editorial review has been finalized. Draft SSRs for the remaining four species were prepared by the BIO Assessment Working Group following the conclusion of the RAP meeting. We need to review these drafts and confirm or modify the content. In particular, the Traffic Light table and Outlook section need to reflect the RAP participants' views.

Therefore, I am calling a meeting via teleconference of RAP participants to review the draft SSRs. Copies of the draft SSRs will be sent to all participants by email or FAX prior to the meeting. Details of the meeting follow:

Date: **Tuesday, November 14, 2000**
Time: **09:30 AST**
Agenda: Review of draft SSRs for wolffish, winter skate, flounder and monkfish

Time	Species
0930	Wolffish
1100	Winter Skate
1200	Lunch break
1300	Flounder
1400	Monkfish

Note that I have allocated about an hour for each review. To ensure we meet this deadline, discussion will need to be focused and participants must be prepared to offer alternative wording or interpretation. For the traffic light chart, we can discuss the merit and interpretation of indicators but the **default position will be to exclude** an indicator if consensus cannot be reached after reasonable discussion.

To connect to the teleconference call 1-888-265-0903 and enter the passcode 1152# (do not forget the # key) at 09:30 on Tuesday, November 14th.

If you intend to participate, it is essential that you inform Wanda Farrell (MFD office) not later than 4:00pm Friday, November 10th at the following: Telephone: 902 426-4890 or E-mail: farrellw@mar.dfo-mpo.gc.ca

Appendix 3: Agenda

Time	Monday	Tuesday	Wednesday	Thursday	Friday
	30-Oct	31-Oct	1-Nov	2-Nov	3-Nov
09:00 - 09:30		Cod, 4X	Proceedings Review	Proceedings Review	Proceedings Review
09:30 - 10:00					
10:00 - 10:30			Assmt Revisions	Assmt Revisions	SSR Reviews
10:30- 11:00					
11:00 - 11:30					
11:30 - 12:00					Discussion & Wrap-up
		Lunch	Lunch	Lunch	Lunch
13:00 - 13:30	***Introduction***	Skate, 4VsW	Plaice, 4VW	SSR Reviews	
13:30 - 14:00	Traffic Light Approach				
14:00 - 14:30	Ocean Overview				
14:30 - 15:00					
15:00 - 15:30	Monkfish, 4VWX	Wolffish, 4VWX	Yellowtail, 4VW		
15:30 - 16:00					
16:00 - 16:30					
16:30 - 17:00					

Appendix 4: Meeting remit

Remit

Meeting of the Maritimes Regional Advisory Process on Scotian Shelf Groundfish
Best Western MicMac Hotel
Dartmouth, Nova Scotia
30 October – 3 November 2000

Stock Assessments

In support of the 1 April 2001 – 31 March 2002 fisheries, full assessments of the stock status of the following resources will be reviewed, as new information is likely to change the last-tabled stock status, new assessment methodology has been used, or the fishery is at the end of a developmental period (i.e. Skate and Monkfish):

- Cod, 4X
- Plaice, 4VW
- Yellowtail, 4VW
- Skate, 4VsW
- Monkfish, 4VWX
- Wolffish, 4VWX

If sufficient data is available, full assessment for the following stocks will also be reviewed:

- Cusk, 4VWX
- Atlantic halibut, 3NO3Ps4VWX5

Stock Status Reports and associated research documents will be produced for these assessments.

Updates

Updates will be available, but not reviewed, for the following stocks where the stock status is unlikely to change, or where work in progress is likely to lead to a significantly improved assessment in 2001:

- Cod, 4Vn
- Cod, 4VsW
- Pollock, 4VWX5Zc
- Haddock, 4VW
- Haddock, 4X
- Silver hake, 4VWX
- Redfish, Unit 3

- Plaice, Yellowtail, and Winter Flounder, 4X
- White Hake, 4VW and 4X/5
- Witch Flounder, 4VW and 4X

These updates will present the most recent trends in the fishery and resource status and provide updated outlooks, based on the 1999 RAP.

Oceanographic Overview

An overview of ocean climate conditions on the Scotian Shelf during 2000, in comparison to the historical record, will be presented. No Stock Status Report will be produced.

Appendix 5: Working Papers.

Beanlands, D, R. Branton, and R. Mohn. 2000. Status of Monkfish. (RAP Working Paper 2000/47)

Branton, R., and J. Black. 2000 summer groundfish survey update for selected Scotia-Fundy groundfish stocks. (*not reviewed*)

Clark, D., S. Gavaris, and S. Paul. 2000. Assessment of cod in Division 4X. (RAP Working Paper 2000/48)

Drinkwater, K.F., R.G. Pettipas, and L.M. Petrie. 2000. Temperature conditions on the Scotian Shelf and Eastern Gulf of Maine in 2000. (RAP Working Paper 2000/46)

Fowler, G.M., and W.T. Stobo. 2000. Status of 4VW American Plaice and Yellowtail flounder. (RAP Working Paper 2000/51)

McRuer, J. 2000. Atlantic wolffish in the Maritimes and Gulf of St. Lawrence. (RAP Working Paper 2000/50)

Poirier, G.A., G.A. Chouinard, D.P. Swain, T. Hurlbut. C. LeBlanc, and R. Morin. 2000. Preliminary results from the September 2000 groundfish survey in the Southern Gulf of St. Lawrence (*not reviewed*)

Simon, J.E., and K. T. Frank. 2000. Assessment of the winter skate fishery in Division 4VsW. (RAP Working Paper 2000/49)

Appendix 6: Research Recommendations

4VWX5Zc Monkfish

1. Stock structure should be investigated.
2. Adequate monitoring should be instituted for the catch of monkfish by the scallop fishery.

4X Cod

1. Investigate use of a model-based treatment to ensure 'missing' sets can be accommodated.

4VsW Winter Skate

1. A detailed examination of the observer data associated with the commercial fishery should be undertaken.